Police and Crime Against Firms in Developing Economies

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Abstract

Economic theory predicts that a rise in police presence will reduce criminal activity. However several studies in the literature have found mixed results. This study adds to the literature by exploring the relationship between the size of police and crime against firms, an important issue especially for developing economies. Using data for about 12,000 firms in 27 developing countries we find that increasing the police force has a negative effect on crime against firms. We also find that several macro-economic factors can weaken or strengthen this negative effect. The results are robust to various sensitivity checks.

1. Introduction

Economic theory predicts that a rising police presence will reduce criminal activity (Becker, 1968). There are essentially two channels through which this takes place – deterrence and incapacitation. According to the former, greater police presence deters potential criminal activity, and with regards to the latter, more police presence incarcerates more criminals and thus reduces the pool of criminals in the streets. However, the theoretical underpinning of the crime – police relationship has received mixed empirical validation. For example, Cameron (1988) finds that 18 out of 22 papers surveyed researchers found either a positive effect of police presence on crime or no relationship between these variables. Fajnzylber et al (2002) find that police presence has a negative effect of on violent crime but a positive and significant effect on property crime.

The mixed empirical evidence has been explained by two reasons. Theoretically the effect of police presence on crime through deterrence or incapacitation has received some criticism. Typically police are not involved directly with crime reduction, and there is evidence that even

the most routine policing strategies fail to deter potential offenders (Kovandzic and Sloan, 2002). Furthermore burglars are found to be rational when engaging in criminal activities, and their choices range from type of crime to commit, frequency, when and how to commit the crime (Kovandzic and Sloan, 2002; Wright and Decker, 1994). The implication is that increasing police presence may actually result in more crime as criminals change from serious (and possibly lucrative) crimes to undertaking less serious crimes more frequently.

Empirically, the positive association between police presence and crime has been blamed on flawed methodology or inadequate consideration of endogeneity issues and omitted variable biases (Marvell and Moody, 1996). A few recent studies have accounted for this problem and found a negative relationship. Levitt (2004) uses instruments for police presence via expenditures allocated to fire fighters and finds a negative relationship between police presence and crime. Di Tella and Schargrodsky (2004) isolate the causal effects of police on crime by examining the impact of an exogenous increase in police presence due to terrorism attacks in Buenos Aires in Argentina and find a negative relationship between police presence and crime.

A natural extension of the literature would be to explore whether the relationship between police and crime for households or in general overall crime rates in the economy also applies specifically to crimes against firms, since overall crime rate results do not give any indication of how the results apply only to firms. The contribution of this paper is that it specifically examines the relationship between police presence and crime against firms in developing economies. Using firm level survey data, losses due to crime as a percentage of sales is used to measure the burden of crime. The use of firm surveys is not plagued with the issue of under-reporting

associated with using police reports to measures of crime. The effect of police on crime against firms may have a range of possible outcomes. A greater police presence may have a stronger deterrence effect on crime against firms than individual crime as criminals are more likely to substitute away from crime against firms, where security measures may be greater, to less serious criminal activities that face less cost. However, most firms may have the capacity to utilize private security measures to deter criminal activity. Consequently, the presence of a police force may reflect the existence of criminal activity, but have no correlation with crime against firms. Thus, which mechanism dominates is an empirical question.

The private sector is a key engine of growth in developing economies. Thus, if businesses experience high levels of criminal activities, the detrimental effect on the economy could be significant. Yet crime against firms has been under-researched in the literature. Hopkins (2002) finds that in Britain about 24% of retailers and manufacturers were burgled in 1993 in contrast to 5.6% of households implying a higher rate of victimization for firms. Large firms experience more crime than small firms, although small firms face a larger burden of crime in a sample of Latin American countries (Amin, 2009). Also firms owned by immigrants are more vulnerable to crime than native owned firms (Amin, 2010).

The contribution of this paper is two-fold. First, we quantify the effect of police presence on the burden of crime experienced by firms. Second, we explore this relationship further by examining how several socio-economic and firm characteristics weaken or accentuate the relationship between crime against firms and police presence.

In order to examine the relationship between police and crime, we use a unique firm level dataset with about 12,000 firms in 27 developing countries maintained by the World Bank's Enterprise Analysis unit (Enterprise Surveys). We find that an increase in police per 100,000 of population by 1 standard deviation results in a 0.029 standard deviation reduction in the losses due to crime. We find that high inequality, high voter turnout, larger cities, and female ownership and management strengthen the negative relationship between police and losses due to crime. On the other hand faster economic growth, good governance, and greater religious fractionalization mitigate the relationship between police and losses due to crime. We use a dummy indicating whether the party of the chief executive is right-wing and the stock of international migrants as a % of the population as instruments and find that the results are retained, if not magnified. The results are also robust to various sensitivity checks.

Section 2 describes the data, section 3 provides the estimation and results, and sections 4, 5, and 6 provide instrumental variable estimations, robustness checks, and conclusions respectively.

2 Data and Main Variables

The data for firm level variables are collected by the World Bank's Enterprise Surveys. The Enterprise Surveys use standard survey instruments to collect firm-level data on a country's business environment from business owners and top managers. The surveys cover a broad range of topics including access to finance, corruption, infrastructure, crime, competition, labor, obstacles to growth and performance measures. The survey is designed to be representative of a country's private non-agricultural economy and only registered firms with at least five employees are included in the sample. The data consists of a random sample of 12,000 firms

across 27 developing countries in different regions stratified by firm size, location, and sector. The survey year ranges between 2007 and 2009. Details of countries in the sample and their respective survey years can be found in the first column of table A3 in the appendix.

2.1 Dependent variable

The dependent variable utilized is losses due to crime as a percentage of annual sales. This variable is derived from the survey question: "In fiscal year [insert fiscal year], what are the estimated losses as a result of theft, robbery, vandalism or arson that occurred on establishment's premises calculated as a percent of annual sales or the total annual value of the losses?"
For total values of crime, the percentage over sales is calculated. Crime losses as a % of sale capture the intensity of crime. We make no distinction between a firm that has experienced no crime and a firm that has experienced crime but incurred no losses. Both firms get a zero value for the dependent variable. The variable averages 0.72% in the sample with a standard deviation of 3.9%. Using country averages across all firms, Azerbaijan has the lowest amount of crime losses at 0.20% of sales, while El Salvador has the highest with 1.73%. Data source and description of the variable can be found in table A1, with summary statistics in table A2.

2.2 Explanatory variable

The main variable of interest is the number of police per 100,000 of population. The variable is obtained from United Nations Survey on Crime Trends and the Operations of Criminal Justice Systems. The variable is typically lagged by 1 year, however due to data constraints, for some countries the lag is not exactly one year previous, but a few years before in certain cases. The specific details of the number of lags are available in table A3 in the appendix. The sample mean

for the number of police is 288, while the standard deviation is 108. Macedonia has the highest number of police with 480 police per 100,000 of the population while Hungary has the lowest with 90 police per 100,000 of population. The country average crime losses and number of police are presented in table A4 for each country in the appendix.

2. 3 Other explanatory variables

We control for several firm level and country level variables. The degree of crime a firm faces may depend on its size, the sector it belongs to, and its locale. We control for firm size using dummies for small and medium firms. A small firm is defined as a firm with less than 20 employees, while a medium firm has workers between 20 and 99. We also have a dummy for manufacturing firms. A priori it is not clear whether a manufacturing firm should have higher crime losses with respect to other sectors. We also include a city size dummy which takes the value of 1 if the city has a population of 250,000 of greater, or is a capital city, and 0 otherwise. We also include a dummy for whether a firm has at least one female owner. All these variables are from the Enterprise Survey's data set.

At the country level, we control for Real GDP per Capita growth, Real GNI per capita, and the Gini index, given their prominence in the literature. For cases where data for the exact date is unavailable, we use data for the closest date available. The exact year of data used for GNI per capita and the Gini index are presented in table A3 in the appendix. We also control for country size using the total population of the country. These data are available from the World Bank's World Development Indicators. Data source and description of the variable can be found in table A1, with summary statistics in table A2.

3 Estimation

We estimate following equation using OLS.

$$(1)\quad crimeloss_{ij} = \beta_1 Policelag_j + \beta_2 GDPgr_j + \beta_3 Fem_{ij} + \beta_4 GNIcap_j + \beta_5 GINI_j + \beta_6 Population_j + \beta_7 Small_{ij} + \beta_8 Medium_{ij} + \beta_9 \text{LargeCity}_{ij} + \beta_{10} Manf_{ij} + \varepsilon_{ij}$$

Where *crimeloss* is the losses due to crime as a % of sales, *Policelag* is the lagged number of police per 100,000 population, *GDPgr* is the real GDP per capita growth, *Fem* is a dummy representing female ownership, *GNIcap* is the real GNI per capita, *GINI* is the gini coefficient, *Population* is the total population of the economy, *Small* and *Medium* are firm size dummies, LargeCity is a dummy for cities with population of 250,000 and greater, or capital cities, and finally *Manf* is a dummy for manufacturing firms.

All estimates are based on standard errors clustered at the country level. In the later sections we add additional variables and interact them with the variable of interest to elucidate several relationships. The usual econometric issues of endogeneity and omitted variable bias are of a concern in the estimation. We limit the problem of reverse causality by using the lags of the number of police. However, under reverse causality we expect a positive correlation between crime and the number of police and thus any negative relationship we uncover would be even stronger if reverse causality was explicitly accounted for. On the other hand omitted variable bias is an issue that is challenging to overcome given data limitations. We address this by using various checks as presented in the robustness section.

3.1 Base Regression Results

All magnitudes discussed in the text are presented in standard deviation units, unless indicated. The figures shown in the tables are in nominal units, not standard deviation units. Since the dependent variable is a ratio of losses due to crime over sales, any reference to a reduction in crime refers to a reduction in losses due to crime as a share of sales. The base estimation results are presented in column 1 of table 1. The coefficient of the number of police is negative and significant at 5%. In terms of magnitude, a one standard deviation increase in the number of police results in a 0.029 standard deviation decline in crime losses. This result indicates that the number of police may effectively be a deterrent for crime against firms, just as studies have shown them to be a deterrent for individual level crime (Di Tella and Schargrodsky, 2004; Levitt, 1997). However, when all controls are excluded from the estimation, a negative relationship between police size and crime persists, but it is not significant unless GNI per capita is controlled for. Thus these results are conditional on the level of income in the country.

A few other results stand out. Both real GDP per capita growth and Real GNI per capita have a negative and highly significant effect[1]. Although the negative effect of GDP per capita growth is not surprising considering individual level crime literature (Fajnzylber et al., 2002; Soares, 2004), the negative effect of GNI per capita crime has been less robust in the literature (Soares, 2004).Thus development may not be criminogenic at the firm level. The Gini coefficient and dummy for large or capital city are not significant despite their well documented effect on individual level crime (Dutta, 2009; Glaeser and Sacerdote, 1999). The size of the country in

[1] Due to the lack of continuous data for GNI per capita for some countries, we use the GDP growth rate instead of the GNI growth rate. This is typical in the literature (Fajnzylber et al, 2002).

terms of population has a positive coefficient implying that firms in larger countries have larger losses due to crime as a percentage of sales.

Certain firm characteristics are found to be significant determinants of the losses due to crime. Having a female owner and manager or being a small or medium firm is likely to increase the losses suffered due to crime. This also implies that large firms experience fewer losses due to crime, perhaps due to safety measures they are able to implement. Manufacturing firms are less likely to sustain heavy losses due to crime than non-manufacturing firms.

We now consider how several country and firm-level factors may influence the effectiveness of increasing police. Studies have indicated that the effectiveness of increasing the police force may depend on several variables such as the incentives for corruption such as governance and development or the distribution of income (Bourguignon, 1999). We also wish to explore how large cities affect the effectiveness of the police force, or whether female owned firms are less correlated with crime in the presence of police. Finally, the extent of social disorganization may render a police expansion ineffective. Thus we examine the strength of the relationship between police expansion and crime and how this relationship depends on factors such as inequality, city size, economic growth, female ownership and management, governance, voter turnouts in elections, and fractionalization.

3.2 Economic Growth

The interaction term between number of police force and economic growth is positive and significant at 5%. The total effect of police on crime losses is still negative at the mean level of

real GDP per capita growth when interacting number of police with GDP per capita growth as indicated in column 2 of table 1. However, looking at the extremes of the sample, Police per 100,000 of population has no overall effect on fast growing countries. The effect of police on crime losses triples in magnitude at the minimum level of GDP per capita growth. The figures are presented in the bottom of column 2 of table 1. The results indicate that increasing the police force by one standard deviation at the mean GDP per capita growth results in a 0.033 standard deviation reduction in the dependent variable. Using the minimum values in the sample of GDP per capita growth, the overall effect of police increases from 0.033 to a 0.103 standard deviation reduction in crime losses. The growth rate turning point, after which the effect of police on crime losses is insignificant, in the sample is 3.7%, which is around the 66^{th} percentile of the sample. These results seem to indicate that growth is a substitute for the police force. Perhaps fast growing countries may have the institutions in place, such as an effective judicial system, which deters criminal activity and thus reduces the requirement of a police force.

3.3 Inequality and City Size

There is substantial literature linking inequality to crime (Ehrlich, 1973; Fajnzylber et al., 2002) and city size to crime (Glaeser and Sacerdote, 1999). This literature finds a positive relationship between inequality and crime, and city size and crime. The former is because high inequality can lower opportunity cost of crime for the most disfavored citizen and also increase the returns to crime, as measured by the income of potential victims. The latter is due to lower probabilities of arrest and recognition in bigger cities than smaller ones.

The interaction of inequality and police is negative and significant at 5%. At the mean level of inequality in the sample, the number of police has a negative and significant effect on the dependent variable when interacting police with the Gini coefficient. In comparison, this relationship becomes more significant at higher levels of inequality, but ceases to be significant at all conventional levels of statistical significance at the lower levels of inequality. As indicated in the bottom column 3 of table 1, a one standard deviation increase in the police force reduces crime losses by 0.033 standard deviations using the mean level of Gini in the sample. This figure increases to 0.088 with a significance of 1% for the highest level of Gini in the sample. Above a Gini value of 37, which is the Gini value for Lithuania and the 42nd percentile value of the sample, the effectiveness of police becomes insignificant at all conventional levels. There are a couple of possible explanations for this. A highly unequal society may imply that the police force is responsive to the elite's call for security especially when it comes to crime against firms. Such high responsiveness can be due to the fact that the elite class is politically powerful. Thus a higher level of police assists business owners in clamping down crime. Another possibility is that in highly unequal societies, the elite class is more likely to use resources in implementing private security. In this scenario, the alternative explanation would be that the level of police is directly correlated with losses due to crime for the non-elite classes of the society, since the elite already utilize private security. It is unclear the exact explanation for this result, which may merit further research.

The interaction between the number of police and city size is negative and significant at 1%. That is, increasing the police force is more effective for larger or capital cities than smaller cities as indicated in column 4 of table 1. A one standard deviation increase in the police force in larger

cities results in a 0.049 standard deviation reduction in the dependent variable, significant at 1%. In contrast, the effect of increasing police by one standard deviation in small cities is insignificant. One possible reason could be that small cities have strong community networks, making it difficult to commit crime against firms. Thus increasing the police force is redundant. In contrast large cities have weaker community ties, and thus the anonymity makes crime more feasible, therefore increasing the effectiveness of increasing the police force.

3.4Female Ownership & Management

The interaction between firms that have a female owner and manager, and the number of police is negative and significant at 1%. Police effectiveness increases if the firm is owned and managed by a female as shown in column 1 of table 2. Increasing the police force by one standard deviation decreases crime losses by 0.097 standard deviations. The effect of police on crime losses for firms that don't have a female owner and manager is insignificant with a 1 standard deviation increase in the police force resulting in a 0.021 standard deviation reduction in the dependent variable. If female owners and managers are more likely to be targets of criminal activity, one interpretation is that an increase in the police force appears to be more effective in assisting the more vulnerable or less well off in society.

3.5 Governance

We use ICRG's Quality of government as a governance indicator, with higher values of the variable indicating better governance. A priori it is expected that the higher the quality of governance, which may imply less corruption and bureaucracy, the more effective a police expansion will be in reducing crime losses. However, our results show the opposite. The

interaction term between the number of police and the quality of government is positive and significant at 10%. At the mean value of the governance indicator, the effect of police is negative and significant at 1%. This result is magnified at the minimum level of governance, but loses significance at the maximum level. The magnitudes are presented at the bottom of column 2 in table 2. The results indicate that a one standard deviation increase in the police force results in a 0.043 standard deviation reduction in crime losses at the mean level of the Quality of Governance index. This figure doubles to 0.080 at the minimum level of governance, significant at 1%. These results seem to indicate that a high level of governance is a substitute for an expansion of the police force.

3.6 Voter Turnout and Fractionalization

Social disorganization theories indicate that factors that diminishes the effectiveness of informal social controls increase criminal activity (Kelly, 2000). Here we consider two indicators of social disorganization – voter turnout in elections, and religious fractionalization. A higher voter turnout indicates confidence in the institutions and better social organization. Similarly, a larger religious fractionalization would make social organization more difficult. Thus we expect a higher level voter turnout, or a lower level of religious fractionalization, and hence less social disorganization will result in a police expansion being more effective. Columns 4 and 5 of table 2 present the results. The interaction between voter turnout and police is negative and significant at 1%, while the interaction between religious fractionalization and police is positive and significant at 10%. At the sample mean values of the disorganization variables, an increase in the police force has a negative effect on the dependent variable - a 0.027 and 0.030 standard deviation reduction in crime losses for voter turnout and religious fractionalization respectively.

Both results are significant at 5%. However, results vary when examining the extremes of the sample. At both the sample minimum for voter turnout and the maximum value of religious fractionalization, police has no significant effect on crime losses. However, the effect of police on crime losses increases in magnitude and retains or increases significance using the minimum sample value of religious fractionalization or the maximum sample value of voter turnout. The magnitude is a 0.053 standard deviation reduction in crime losses for the sample minimum of religious fractionalization, and 0.076 standard deviation reduction in crimes losses for the sample maximum of voter turnout, both significant at 1%. The turning point where the effect of an increase in the police force ceases to be significant is a voter turnout below 0.7, right below the mean of the sample, around the 46^{th} percentile. For religious fractionalization the turning point is 0.43 (62^{nd} percentile), beyond which an increase in the police force has an insignificant effect. Both these results are consistent with the theory of social disorganization and crime.

4. Instrumental Variables

We use two instruments for police strength– a dummy indicating whether the party of the chief executive is right-wing or not and the stock of international migrants as a % of the population. The right-wing indicator is obtained from the database of political institutions (DPI) and is defined as conservative, Christian democratic or right-wing. Right wing governments prefer less government intervention and are thus more likely to decrease the police force. Furthermore, it has been shown that conservative voters typically perceive immigrants as illegal, and thus a larger migrant stock may push conservative governments to spend more on increasing the police force (Fennelly and Federico, 2008). Thus we expect that the presence of right wing governments is negatively correlated with the size of the police force, while international

migration stocks in the country are positively correlated with the size of the police force. However, there is no reason to expect a direct effect of the instruments on crime losses. The first stage estimates are presented in column 2 of table 3, with the expected signs for right wing governments and migration stocks. We report the second stage results using instrumental variables in table 3, column 1. The coefficient of police per 100,000 of population using instrumental variables retains the sign and significance of the base estimations. The magnitude increases in absolute terms from -0.0011 in the base estimations to -0.0025 in the estimations using the instrumental variables. As indicated in the bottom of table 3, the Sargen-Hansen test of overidentifying restrictions is not rejected for all conventional levels of significance, thus we cannot reject the null that all the instruments are valid. We also reject that the estimation is underidentified at 5% level of significance.

5. Robustness

We check for the robustness in terms of model specification. Several studies have shown that female population (Di Tella and Schargrodsky), corruption (Gaviria, 2002), fractionalization (fajnzylber et al., 2000), trade (Ghosh et al., 2011), and government spending (Naidoo, 2006) are factors that influence crime. We add variables that proxy for the aforementioned factors and present the results in table A5. We also include firm level variables such as total employees and security costs as a % of total sales and check if they affect our main estimation results. As shown in table A5, including these sets of variables neither improves the goodness of fit, and thus does not improve explanatory power of the model, nor reduce the significance of the variable of interest.

We also worry that extreme observations in the sample may be driving the results discussed above. Thus we omit the top 1%, bottom 1 %, and top and bottom 1% observations of losses due to crime as well police size. As indicated in table A6, our main results remain quantitatively unchanged from above.

Finally, we worry that our results may be dominated by certain countries. However, we do not want to drop too many observations. Thus we drop countries with less than 1,000 observations, one at a time, from the sample and see if the coefficient of police is affected. As indicated by figure 1, the results are not dominated by any particular country in the sample as we retain the sign and significance at 10%.

6. Conclusion

This study adds to the literature by exploring the relationship between police presence and crime against firms. The proposed mechanism is that police presence serves to reduce losses firms face due to crime. We find a negative relationship between an increase in police size and crime against firms. We find that a one standard deviation increase in the police force per 100,000 of population decreases losses due to crime by 0.029 standard deviations. We find that this negative relationship between police size and crime losses is stronger (more negative) in big cities, countries with high voter turnouts, high inequality, and firms that are owned and managed by a female than males.

There are several opportunities for future research in the area. Due to data limitations, we are unable to explore the quality aspect of police force as a deterrent to crime. It would also be

interesting to see how the presence of police affects crime against firms given local conditions. It would also be interesting to see if the results in this study hold for panel data that allow for filtering out country specific factors from spuriously driving the results.

TABLE 1: POLICE AND CRIME AGAINST FIRMS (LOSSES DUE TO CRIME/SALES)

	BASE	Police lagged x GDP growth	Police lagged x Gini	Police lagged x Large City or Capital
	1	2	3	4
Police per 100,000 persons	-0.0011**	-0.0020**	0.0052*	0.0004
	[0.0005]	[0.0009]	[0.0027]	[0.0006]
Police x GDP per Capita Growth		0.0003**		
		[0.0001]		
Police x GINI			-0.0002**	
			[0.0001]	
Police x Large City or Capital				-0.0022***
				[0.0005]
GDP per Capita Growth	-0.0808***	-0.1679***	-0.0706***	-0.0821***
	[0.0208]	[0.0471]	[0.0230]	[0.0199]
Firm with Female Owner	0.1181*	0.1078*	0.1143*	0.1069*
	[0.0632]	[0.0630]	[0.0616]	[0.0622]
Real GNI per capita (in 100s)	-0.0058***	-0.0061***	-0.0056***	-0.0060***
	[0.0012]	[0.0012]	[0.0011]	[0.0010]
GINI	-0.0065	-0.0066	0.0455*	-0.0069
	[0.0113]	[0.0114]	[0.0258]	[0.0101]
Population in Millions, Total	0.0034*	0.0025	0.0022	0.0042***
	[0.0017]	[0.0019]	[0.0015]	[0.0014]
Small firms	0.4023***	0.3979***	0.3955***	0.4040***
	[0.0940]	[0.0937]	[0.0936]	[0.0937]
Medium firms	0.1664**	0.1654**	0.1592**	0.1631**
	[0.0658]	[0.0654]	[0.0655]	[0.0654]
Large City or Capital	0.0331	0.0454	0.0398	0.6432***
	[0.0953]	[0.0944]	[0.0982]	[0.1681]
Manufacturing	-0.2238**	-0.2312***	-0.2225**	-0.2219**
	[0.0813]	[0.0815]	[0.0822]	[0.0827]
Number of Countries	27	27	27	27
Number of Observations	12274	12274	12274	12207
Effect of 1 std dev increase in Police: Change in the Standard Deviation of the Dependent Variable				
Base	-0.029**			
Using Mean		-0.033**	-0.033***	
Using Min		-0.103**	0.029	
Using Max		0.032	-0.088***	
Interacted Dummy =0				0.012
Interacted Dummy =1				-0.049***

* significant at 10%; ** significant at 5%; *** significant at 1%, Standard errors in brackets clustered at the country level

TABLE 2: POLICE AND CRIME AGAINST FIRMS (LOSSES DUE TO CRIME/SALES)

	Police lagged x Female Owner & Manager	Police lagged x Quality of Gov.	Police lagged x Voter Turnout	Police lagged x Religious Fractionalization
	1	2	3	4
Police per 100,000 persons	-0.0008	-0.0060**	0.0065**	-0.0019***
	[0.0005]	[0.0026]	[0.0025]	[0.0004]
Police x firm with female own and manager	-0.0028***			
	[0.0006]			
Firm with female owner and manager	1.0427***			
	[0.2078]			
Police x Quality of Government		0.0083*		
		[0.0043]		
Quality of Government		-3.4696**		
		[1.5425]		
Police x Voter Turnout			-0.0104***	
			[0.0033]	
Voter Turnout			2.5419**	
			[1.0928]	
Police x Religious Fractionalization				0.0025*
				[0.0014]
Religious Fractionalization				-0.6244
				[0.4729]
GDP per Capita Growth	-0.0856***	-0.0970***	-0.0829***	-0.0762***
	[0.0237]	[0.0211]	[0.0199]	[0.0221]
Firm with Female Owner		0.1202*	0.1168*	0.1180*
		[0.0661]	[0.0626]	[0.0625]
Real GNI per capita	-0.0056***	-0.0041***	-0.0054***	-0.0052***
	[0.0011]	[0.0013]	[0.0013]	[0.0013]
GINI	-0.0093	-0.0181	-0.0098	-0.0024
	[0.0128]	[0.0114]	[0.0113]	[0.0119]
Population in Millions, Total	0.0029*	0.0028*	0.0049***	0.0041**
	[0.0016]	[0.0016]	[0.0016]	[0.0015]
Small firms	0.3513***	0.4069***	0.4033***	0.4020***
	[0.0990]	[0.1032]	[0.0952]	[0.0943]
Medium firms	0.1328*	0.1755**	0.1683**	0.1653**
	[0.0754]	[0.0674]	[0.0664]	[0.0657]
Large City or Capital	0.0579	0.0354	0.0567	0.0516
	[0.0901]	[0.1018]	[0.0983]	[0.0957]

Manufacturing	-0.2275** [0.0880]	-0.2251** [0.0907]	-0.2172** [0.0846]	-0.2224** [0.0816]
Number of Countries	27	24	27	27
Number of Observations	12449	11242	12274	12274
Effect of 1 std dev increase in Police: Change in the Standard Deviation of the Dependent Variable.				
Using Mean		-0.043***	-0.027**	-0.030***
Using Min		-0.080***	0.047*	-0.053***
Using Max		0.015	-0.076***	-0.005
Interacted Dummy =0	-0.021			
Interacted Dummy =1	-0.097***			

TABLE 3: POLICE AND CRIME AGAINST FIRMS (LOSSES DUE TO CRIME/SALES)– INSTRUMENTAL VARIABLES

	% of Losses Due to Crime Over Sales IV Estimates Second Stage Results	Police per 100,000 persons lagged First Stage Results
	1	
Police per 100,000 persons lagged	-0.0025**	
	[0.0012]	
Real GDP per Capita Growth	-0.0889***	-4.6990
	[0.0250]	[7.7187]
Right wing government		-107.1931**
		[47.0149]
International migrant stock (% of population)		8.8599***
		[3.2290]
Firm with Female Owner	0.1107*	-2.7705
	[0.0594]	[6.5694]
Real GNI per capita in 100s	-0.0056***	0.8227
	[0.0013]	[0.6320]
GINI	-0.015	0.1940
	[0.0156]	[4.3247]
Population in Millions, Total	0.0029*	-0.4467
	[0.0016]	[1.1525]
Small firms	0.4002***	-1.3706
	[0.0928]	[2.7090]
Medium firms	0.1681***	0.4318
	[0.0643]	[2.0697]
Large City or Capital	0.0949	34.4200*
	[0.1244]	[19.8669]
Manufacturing	-0.2027**	-13.8239***
	[0.0853]	[4.5140]
Number of Countries	27	27
Number of Observations	12274	12274
Instruments	Right wing government, International migrant stock (% of population)	
Under-identification test (Kleibergen-Paap LM statistic) P-value:	0.0322	
Hansen J statistic (over-identification test of all instruments) p-value:	0.7219	

* significant at 10%; ** significant at 5%; *** significant at 1%, Standard errors in brackets clustered at the country level

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TABLE A1: VARIABLE DEFINITIONS

Variable	Definition	Data Source
Losses Due to Crime (% of sales)	Response to the Question: "In fiscal year [insert fiscal year], what are the estimated losses as a result of theft, robbery, vandalism or arson that occurred on establishment's premises calculated as a percent of annual sales or the total annual value of the losses?" For actual values, % of sales was calculated.	Enterprise Surveys, World Bank
Real GDP per Capita Growth	Real GDP per Capita Growth Rate, constant 2000 USD	Word Development Indicators (WDI), World Bank
Police per 100,000 persons lagged	Police per 100,000 persons lagged. Due to data constraints, for some countries the lag is not exactly lagged by one year. Specifics of all lag years can be found in the appendix.	United Nations Survey on Crime Trends and the Operations of Criminal Justice Systems
Firm with Female Owner	Yes Response to Question: "Are any of the owners female?"	Enterprise Surveys, World Bank
Female Owner and Manager	Yes Response to Questions: "Is the Top Manager female?" and "Are any of the owners female?"	Enterprise Surveys, World Bank
Real GNI per capita (in 100s)	GNI per Capita, Constant 2000 USD	Word Development Indicators (WDI), World Bank
GINI	Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality.	WDI, World Bank, Development Research Group
Population, Total in millions	Total Population	Word Development Indicators (WDI), World Bank
Small firms	Dummy is 1 if firm is small (<20)	Enterprise Surveys, World Bank
Medium firms	Dummy is 1 if firm is medium (20-99)	Enterprise Surveys, World Bank
Large City or Capital	Dummy is 1 if city is either the capital or has more than 250,000 population	Enterprise Surveys, World Bank
Manufacturing	Dummy is 1 for manufacturing firms	Enterprise Surveys, World Bank
Quality of Government	Mean value of the ICRG governance variables "Corruption", "Law and Order", and "Bureaucracy Quality", scaled 0-1. Higher values indicate better quality of government. 1990-2007 average used.	International Country Risk Guide – The PRS Group
Voter Turnout	Turnout in parliamentary elections measured as the total number of votes cast divided by the number of registered voters.	IDEA: International Institute for Democracy and Electoral Assistance http://www.idea.int/vt/index.cfm
Years of Schooling	Average Years of Schooling of Population over 15. 1990-2007 average used. 1990-2007 average used.	Barro and Lee (2010)
Corruption	Corruption Perception Index: 10 point scale where higher values indicate less corruption. 1995-2009 average used.	Transparency International ww.transparency.org
Religion Fractionalization	Probability that two randomly selected people from a given country belong to different religions	Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg (2003)
Employees	Response to Question: "At the end of fiscal year [insert last complete fiscal year], how many permanent, full-time employees did this establishment employ?"	Enterprise Surveys, World Bank

Ethnic Fractionalization	Probability that two randomly selected people from a given country will not belong to the same ethnic group	Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg (2003)
Language Fractionalization	Probability that two randomly selected people from a given country do not speak the same language	Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg (2003)
Security Costs as a % of sales		Enterprise Surveys, World Bank
Polity 2	Index of Democracy (Polity 2). Score between -10 and 10 that indicate how democratic a country. Values increase with greater democracy. 1990-2007 average used.	Polity IV, http://www.systemicpeace.org/polity/polity4.htm
Proportion of Female Population	Population, female (% of total)	WDI, World Bank
Life Expectancy		WDI, World Bank
Tax over GDP		Government Financial Statistics (GFS), International Monetary Fund
Investment over GDP	Total government consumption over GDP	Penn World Tables
Government Consumption over GDP	Total public and private investment over GDP	Penn World Tables
Government Spending on Public Order & Safety over Total Spending	Includes spending on police, fire protection services, law courts, and prisons	Government Financial Statistics (GFS), International Monetary Fund
Inflation		WDI, World Bank
Trade	Exports plus imports as a % of GDP	WDI, World Bank
Right Wing Government Dummy	For parties that are defined as conservative, Christian democratic, or rightwing	Database of Political Institutions (DPI)
International Migrant Stock as % of Population	International migrant stock is the number of people born in a country other than that in which they live, including refugees.	WDI, World Bank

TABLE A2: SUMMARY STATISTICS

Variable	Mean	Std. Dev.	Min	Max	Data Unit
Losses Due to Crime (% of sales)	0.716	3.942	0.000	100.000	Firm
GDP per Capita Growth	2.656	4.213	-5.529	10.192	Country
Police per 100,000 persons lagged	287.894	108.187	90.110	480.013	Country
Firm with Female Owner	0.419		0.000	1.000	Firm
Female Owner and Manager	0.152		0.000	1.000	Firm
Real GNI per capita (in 100s)	37.345	31.014	2.257	141.816	Country
GINI	39.826	7.768	25.810	52.330	Country
Population, Total in millions	28.615	27.065	1.353	141.816	Country
Small firms	0.369		0.000	1.000	Firm
Medium firms	0.378		0.000	1.000	Firm
Large City or Capital	0.627		0.000	1.000	Firm
Manufacturing	0.537		0.000	1.000	Firm
Quality of Government	0.525	0.101	0.351	0.791	Country
Voter Turnout	0.718	0.089	0.460	0.893	Country
Years of Schooling	8.066	1.816	2.850	11.689	Country
Corruption	3.369	0.960	1.982	6.091	Country
Religion Fractionalization	0.335	0.201	0.005	0.685	Country
Employees	121.246	478.223	1.000	20843	Firm
Ethnic Fractionalization	0.383	0.173	0.118	0.663	Country
Language Fractionalization	0.372	0.254	0.030	0.836	Country
Security Costs as a % of sales	1.575	5.798	0.000	384.615	Firm
Polity 2	6.560	4.526	-7.000	10.000	Country
Proportion of Female Population	51.040	1.437	49.165	54.020	Country
Life Expectancy	71.303	3.213	64.123	78.314	Country
Tax over GDP	0.150	0.031	0.089	0.210	Country
Investment over GDP	0.210	0.039	0.150	0.311	Country
Government Consumption over GDP	0.081	0.038	0.047	0.213	Country
Government Spending on Public Order & Safety over Total Spending	0.061	0.021	0.039	0.116	Country
Inflation	10.912	8.687	2.358	50.705	Country
Trade over GDP	86.790	35.835	37.354	168.314	Country
Right Wing Government Dummy	0.259		0.000	1.000	Country
International Migrant Stock as % of Population	4.733	5.350	0.149	19.631	Country

TABLE A3: POLICE, GINI, AND GNI PER CAPITA DATA AND SURVEY YEAR

Country Survey Year	**Police per 100,000 persons lagged Year**	**GINI**	**GNI per Capita**
Argentina 2009	2008	2009	2009
Azerbaijan 2008	2006	2008	2008
Belarus 2007	2004	2007	2004
Bosnia and Herzegovina 2008	2007	2007	2007
Costa Rica 2009	2006	2009	2009
Czech Republic 2008	2007	1996	2008
Ecuador 2009	2006	2009	2009
El Salvador 2009	2006	2007	2009
Estonia 2008	2007	2004	2008
Fyr Macedonia 2008	2006	2008	2005
Hungary 2008	2007	2007	2008
Kazakhstan 2008	2007	2007	2008
Latvia 2008	2007	2008	2008
Lithuania 2008	2007	2008	2008
Moldova 2008	2007	2008	2008
Mongolia 2008	2004	2008	2000
Nepal 2008	2006	2004	2000
Nicaragua 2009	2006	2005	2009
Paraguay 2009	2006	2008	2009
Peru 2009	2004	2009	2009
Philippines 2008	2007	2006	2008
Poland 2008	2007	2008	2008
Romania 2008	2007	2008	2008
Slovak Republic 2008	2007	1996	2008
Slovenia 2008	2007	2004	2008
Turkey 2007	2006	2008	2007
Ukraine 2007	2006	2008	2007

TABLE A4: CRIME AND GENDER - COUNTRY AVERAGES

Country	% of Losses Due to Crime Over Sales	Police per 100,000 of Population
Argentina	0.63	206.79
Azerbaijan	0.20	136.98
Belarus	0.72	325.46
Bosnia and Herzegovina	0.44	157.02
Costa Rica	0.54	275.27
Czech Republic	0.48	429.49
Ecuador	1.11	292.58
El Salvador	1.73	275.20
Estonia	1.69	241.87
Fyr Macedonia	0.50	480.01
Hungary	0.25	90.11
Kazakhstan	0.60	449.43
Latvia	0.42	407.88
Lithuania	0.43	332.91
Moldova	0.54	256.50
Mongolia	0.52	277.27
Nepal	0.87	201.97
Nicaragua	1.68	166.81
Paraguay	1.54	331.48
Peru	0.64	323.03
Philippines	1.32	135.16
Poland	0.45	257.89
Romania	0.36	235.21
Slovak Republic	0.64	374.92
Slovenia	0.26	396.54
Turkey	0.38	451.86
Ukraine	0.45	358.16

TABLE A5: ROBUSTNESS – ADDED CONTROLS

	Coefficient of Police per 100,000 of Population	Adjusted R Squared
BASE	-0.0011* [0.0005]	0.01
Fractionalization Ethnic, Language	-0.0008* [0.0004]	0.01
Employees and Security Total Employees, Security Costs as a % of sales	-0.0012** [0.0005]	0.01
Corruption and Democracy Corruption (Transparency International), Polity 2 Score	-0.0011** [0.0005]	0.01
Female Population Proportion of Female Population	-0.0010* [0.0005]	0.01
Government Spending and Inflation Government Spending on Public Order & Safety, Government Consumption & Investment over GDP, Taxes over GDP, Inflation	-0.0020** [0.0009]	0.01
Trade Trade as a % of GDP	-0.0009* [0.0005]	0.01

TABLE A6: ROBUSTNESS – EXTREME OBSERVATION DOMINANCE

	Coefficient of Police per 100,000 Population
Dropping Extreme Crime Loss Observations	
Bottom 1%	-0.001* [0.001]
Top 1%	-0.001** [0.001]
Top and Bottom 1%	-0.001** [0.001]
Dropping Extreme Police Observations	
Bottom 1%	-0.001* [0.001]
Top 1%	-0.001** [0.000]
Top and Bottom 1%	-0.001** [0.000]

FIGURE 1: COUNTRY DOMINANCE, LESS THAN 1000OBSERVATIONS